

CLAIMS

1. A switch valve for use in an extracorporeal blood flow circuit comprising:
 - a valve housing having a chamber,
 - four openings communicating with the chamber; and
 - a valve member located in the valve chamber and movable therein to change the direction of blood flow among the openings, wherein the width of the valve member is smaller than a peripheral dimension of the openings.
2. A switch valve for use in an extracorporeal blood flow circuit comprising:
 - a valve housing having a chamber,
 - four openings communicating with the chamber; and
 - a valve member located in the valve chamber and movable therein to change the direction of blood flow among the openings, wherein the valve member is arranged to adopt an idle position in which all four openings are interconnected.
3. A switch valve for use in an extracorporeal blood flow circuit comprising:
 - a valve housing having a chamber,
 - four openings communicating with the chamber; and
 - a valve member located in the valve chamber and movable therein to change the direction of blood flow among the openings, wherein movement of the valve member does not ever fully block any one of the openings.
4. The switch valve claimed in claim 1 or 3, wherein the valve member is arranged to adopt an idle position in which all four openings are interconnected.

5. The switch valve claimed in claims 1 or 2, wherein the valve member does not ever fully block an opening.
6. The switch valve claimed in anyone of claims 1 or 2 or 3, wherein the valve member is pivotable in the chamber.
7. The switch valve claimed in claim 6, wherein the valve member is pivotable from a normal blood flow position, through an idle position and to a reverse blood flow position.
8. The switch valve claimed in claim 6, wherein the valve member is pivotable through 90°.
9. The switch valve claimed in anyone of claims 1 or 2 or 3, wherein the openings are disposed on the valve housing diametrically opposite to each other.
10. The switch valve claimed in claim 9, wherein the valve chamber is cylindrical and the openings are spaced 90° relative to each other around the chamber.
11. The switch valve claimed in anyone of claims 1 or 2 or 3, wherein the openings are each provided with a respective connector.
12. The switch valve claimed in anyone of claims 1 or 2 or 3, wherein the valve member forms a partition dividing the valve chamber in two portions.
13. The switch valve claimed in claim 12, wherein each of said portions is semi-circular.

14. The switch valve claimed in anyone of claims 1 or 2 or 3, wherein the valve member includes a valve partition that extends into the valve chamber and a wing with which the valve member can be manually moved.
15. The switch valve as claimed in claim 14, wherein the valve member includes a shoulder, which limits the pivoting movement of the valve member in the chamber.
16. The switch valve as claimed in claim 15, wherein the shoulder cooperates with a groove on the periphery of the valve chamber.
17. The switch valve as claimed in claim 16, wherein the groove has recesses defining normal and reverse positions.
18. The switch valve as claimed in claim 17, wherein the groove also has a recess defining the idle position.
19. The switch valve as claimed in claim 11, wherein a first and a second of said connectors extend diametrically opposite from the valve housing and a third and a fourth said connectors are symmetrically inclined by less than 90 degrees with respect to a direction of the first connector.
20. The switch valve as claimed in claim 2 or in claim 3, wherein the peripheral width of the valve member is smaller than a peripheral dimension of the openings.
21. An extracorporeal circuit comprising:
a dialyzer blood compartment;

a switch valve according to anyone of claims 1 or 2 or 3, wherein the valve comprises a connector for each of said openings, said connectors including:

- a blood inlet connector,
- a blood outlet connector,
- a circuit inlet connector, and
- a circuit outlet connector, and wherein the circuit outlet connector is connected to an inlet of the dialyzer blood compartment and the circuit inlet connector is connected to an outlet of the dialyzer blood compartment.

22. An extracorporeal circuit according to claim 21 comprising a line connecting the circuit outlet connector to the inlet of the dialyzer blood compartment, a line connecting the circuit inlet connector to the outlet of the dialyzer blood compartment and two further lines connecting the remaining connectors to venous and arterial needles.

23. An extracorporeal circuit according to claim 21, wherein a peripheral width of the valve member is smaller than a peripheral dimension of the openings.

24. A blood treatment equipment comprising:

- a dialyzer having a blood compartment and a dialysis fluid compartment separated by a semi-permeable membrane,
- an arterial needle for connection to a patient's fistula,
- a venous needle for connection to a patient's fistula downstream with respect to the arterial needle connection,
- a switch valve comprising:
 - a valve housing having a chamber,
 - four openings communicating with the chamber,

a valve member located in the valve chamber and movable therein to change the direction of blood flow among the openings, wherein movement of the valve member does not ever fully block anyone of the openings, and a connector for each respective opening, said connectors including:

a blood inlet connector,

a blood outlet connector,

a circuit inlet connector connected to an outlet of the dialyzer blood compartment,

a circuit outlet connector connected to an inlet of the dialyzer blood compartment,

an arterial line connecting the arterial needle to the blood inlet connector,

a venous line connecting the venous needle to the blood outlet connector,

the switch valve being operable between a normal position, wherein fluid is directed from the blood inlet connector to the circuit outlet connector and from the circuit inlet connector to the blood outlet connector, and a reversed position, wherein fluid is directed from the blood outlet connector to the circuit outlet connector and from the circuit inlet connector to the blood inlet connector.

25. A blood treatment equipment according to claim 26, comprising a blood pump operating on a line segment extending between said circuit outlet connector and said inlet of the dialyzer blood compartment.

26. A blood treatment equipment according to claim 26, comprising a blood pump operating on said arterial line.

27. A blood treatment equipment according to claim 26, wherein a peripheral width of the valve member is smaller than a peripheral dimension of the openings.
28. A blood treatment equipment according to claim 26, wherein the valve member is arranged to adopt an idle position in which all four openings are interconnected.